H.M.S. *Sealark* in 1905 always wore a pendant of black coral under his blouse, and all the black "boys" on board begged pieces from us "to keep them from drowning." Inquiries show, too, that black ornaments, bracelets, rings, and pieces strung into necklets are common on all coasts from Zanzibar to Singapore. They are usually described as wood, but, as it is stated that the ends overlap or that the bracelets or rings are spiral, they are probably of coral. A Japanese professor says that black coral is much valued in China and Japan, and largely used by coastal people for jewelry. Branched growths are not infrequently brought up on the hook when fishing outside coral reefs, but, while there are frequent indications of local use, there is no regular fishery for such as an article of commerce.

Rheumatism would seem to be particularly a "charm" disease. All over England a potato is carried in the pocket as a remedy, and several ladies residing in Cambridge derive great benefit from the permanent presence of horse chestnuts below their couches. Rings of metal—tin in many parts of the West—are a regular specific. One of the black bracelets in question has a decorative value of its own. We wonder, however, whether the ladies might not find Chinese jade a still better specific.

Obituary.

J. M. DODDS.

BY the death of John Macalister Dodds on November 13 last Cambridge has lost a great gentleman, while many people, both inside his college and outside, have lost a most kindly, helpful, and amusing friend. He took his degree as fifth wrangler in 1881, and returned from Glasgow to Peterhouse as bursar and mathematical lecturer in 1884, since when he had resided in college continuously. He lectured, as usual, on November 12, and was found dead in his chair the following morning. Apparently the only published paper he was connected with was one on the value of the B.A. unit of resistance (R. T. Glazebrook and J. M. Dodds, Phil. Trans., 1883).

On returning to Cambridge Mr. Dodds gave advanced lectures on the theory of sound for some years, in addition to his routine work, but henceforth his main interest lay in the theory of numbers, the theory of groups, and kindred topics. Particularly was he interested in the theory of numbers, and he worked at it incessantly. I have heard him say that he tended to lose interest when the continuous variable was introduced into that beautiful subject. Indications are not lacking that such feelings were shared by Gauss himself, but in reality the leaning of Mr. Dodds was towards ancient, simply stated, and difficult problems of a pre-Gaussian kind. He was extraordinarily astute, for example, in the application of Fermat's famous principle of infinite descent. Formal algebra, too, had a great fascination for him.

A word must be said of his generosity in working at a problem with a colleague; the algebraical avenue being left to him, Mr. Dodds was untiring in his efforts until the inquiry became hopeless or the question was determined. One habit of his is probably now obsolete; each long vacation he made a complete set of solutions of the Tripos papers that had just appeared. Younger generations do not, I think, regard that as being any longer a task that provides mental exhilaration, even supposing the problems come out.

This is not the place to dilate on the wide knowledge of books and human beings that vast reading and irresistible social powers had given Mr. Dodds, yet no account of him can be complete without an allusion to what was, it may be, the most marked feature in his attitude on general questions. He was an intense and innate conservative; the smallest suggestion of change always seemed to arouse his instant opposition. As he was an acute dialectician, this might easily have become exasperating, but he was so big, so strong, and so laughingly good-natured that the almost inevitable did not happen. If he sometimes laughed at others, he often laughed at himself.

J. H. G.

WE regret to announce the deaths, on December 9, of LORD LINDLEY at the age of ninety-three years, and, on December 11, of LORD HALSBURY at the age of ninety-eight years. Both were elected fellows of the Royal Society under the special clause which permits the admission of members of the Privy Council—Lord Lindley on January 20, 1898, and Lord Halsbury on January 13, 1887. It may be recalled that Lord Lindley was the son of the late Dr. John Lindley, professor of botany in University College, London.

Notes.

ON Saturday, December 10, the Official Referee under Part I. of the Safeguarding of Industries Act gave his decision on the complaint that santonin has been improperly included in the list of goods upon which import duty must be paid. The drug is derived from flowers grown almost exclusively in Southern Russia and Turkestan, and is extracted by a simple process which does not appear to demand professional skill; its application is medicinal as distinguished from chemical, but the evidence on the question whether it should be regarded as a "fine chemical" was most conflicting, and emphasised the difficulty which may be experienced in defining a "synthetic organic chemical" within the meaning of the Act. After two hearings Mr. Cyril Atkinson, K.C., expressed the view that the word "chemical" is not a scientific term, but implies a distinctive substance which is, generally speaking, brought into being by a chemical reaction, or primarily used for taking part in a chemical reaction; whilst "fine" chemicals are those which are manufactured by processes involving chemical skill. Furthermore, he ruled that santonin be removed from the list, on the ground that it is not brought into existence by processes of chemical action, and is not applied in chemical changes; thus its inclusion would not benefit the industry, but would only tend to raise the price of a useful drug.

WE regret to note that the *Irish Naturalist* has reached a very critical stage in its existence, and unless a practical scheme is forthcoming which will place the magazine in a better financial position, publication will cease at the end of the year. At present costs the annual loss is estimated at 50*l*. per annum. The *Irish Naturalist* has served for thirty years with conspicuous success under the able guidance of the present editors as the mouthpiece of students of natural history in Ireland, and we hope that a workable scheme will be evolved to save the periodical for future workers. But the general question is a much larger one. All magazines of this kind, with a special appeal and a limited circulation, are labouring under similar difficulties, and unless something is done many will be forced to cease publication. Raising the price only results in a reduction of the number of subscribers. It would be a thousand pities if they have to be abandoned. They perform a useful and valuable service in the stimulation of interest in natural history, and by the publication of the results obtained by local workers. We feel that the whole question is one which demands sympathetic consideration by one or other of the national scientific societies, such as the Royal Society, the British Association, or the Conjoint Board of Scientific Societies, or even by the Government itself through the Board of Education.

A CHADWICK public lecture on "The History of the Doctrine of Infection" was delivered by Dr. Charles Singer on December 8 in the Barnes Hall, Royal Society of Medicine. Dr. Singer pointed out that primitive folk regard everything as being "infectious"—that is, communicable—and believe that, by a process of "sympathetic magic," moral qualities and powers pass from person to person, and that physical attributes are similarly conveyed from object to object. Sanitary legislation among many primitive peoples is based on this doctrine of "sympathy." The classical writers of antiquity who deal with medical topics for the most part regarded epidemic diseases as being conveyed by an atmospheric element, or "miasma," and only a few diseases as being transmitted from person to person, while the laymen of the same period laid more stress on conveyance from person to person. From the twelfth to the sixteenth centuries medical teaching was mainly derived from Arabian writers, who adopted much the same view as the classical writers. In 1543 Hieronymo Fracastoro, of Verona, published a work, "De Contagionibus," in which infection was regarded as being due to small seeds or *semina*, too minute to be seen, but capable of multiplication, and specific for each infectious disease. These views became widely adopted, and the general phenomena of epidemics were closely studied, so that by the commencement of the eighteenth century the materials for a theoretical solution of the problem of the nature of infection were well-nigh complete.

THE Air Ministry has announced that the second Air Conference will be held at the Guildhall, London, on February 7–8 next. The conference, which will be opened by the Lord Mayor of London, will deal chiefly with the future of aviation, with special reference to its development as a regular and speedy form of commercial transport. The papers presented will be divided into two main groups, the one dealing with civil aviation in general and the other with technical problems. The whole of the second day will be devoted to discussions arising out of the previous day's papers. The Secretary of State for Air will preside during the civil aviation portion of the proceedings, and Lord Weir of Eastwood during the technical sessions. The principal paper on civil aviation will be read by Lord Gorell, Under-Secretary of State for Air, who will give a general account of progress at home and abroad, and will direct attention to the ways and means whereby the development of civil aviation may be best furthered; in this connection Lord Gorell will endeavour to enlist the practical co-operation of business and other interests. The chief technical paper will be read by Mr. F. M. Green, of Sir W. G. Armstrong, Whitworth Aircraft, Ltd. The London terminal aerodrome at Croydon will be open for inspection on February 6, and demonstrations of amphibian aircraft alighting on the Thames will also take place during the period of the Conference.

THE library of the Chemical Society will be closed for the Christmas holidays at 1 p.m. on Friday, December 23, and will reopen at 10 a.m. on Thursday, December 29.

ACCORDING to the *Times*, a report has reached Norway from Moscow that a Russian expedition, at present exploring in Siberia, has found the bodies of the two lost men of Capt. R. Amundsen's expedition near the mouth of the Yenisei river. These two men left the *Maud* in October, 1918, in the vicinity of Cape Chelyaskin in the hope of making their way to the fishing settlements on the Lower Yenisei, a distance of some 700 miles across the barren tundra. They carried dispatches from Capt. Amundsen. A Norwegian search expedition looked unsuccessfully for traces of the two men along the coast of north-western Siberia in the autumn of 1920, as soon as news from Amundsen reached Norway reporting their departure.

THE Massachusetts Institute of Technology is again without a president. Dr. Ernest Fox Nichols, who was inaugurated last June to succeed the late Dr. R. C. Maclaurin in that office, was taken ill immediately after the ceremony. The illness has resulted, his physicians report, in "certain physical limitations, some of them probably permanent," which would make it unwise for him to assume the responsibilities of the position. He has therefore sent in his resignation, which has been regretfully accepted by the executive committee. Dr. Elihu Thomson, chief engineer of the General Electric Co., who served as acting president after Dr. Maclaurin's death, has again been appointed temporary head of the institute. The physical disqualifications under which Dr. Nichols labours will not restrict his activities in the simpler life of scientific investigation, and he hopes accordingly to return to the research laboratory and to resume the work, connected with certain problems of lighting, which he interrupted to accept the offer of the presidency.

AN account is given in the *Times* of a recent ascent of Mount Kilimanjaro, the extinct volcano in the Tanganyika territory of East Africa. Discovered by German explorers in 1848, the summit was first reached in 1889 by Dr. H. Meyer, and since then it has been scaled several times. The last ascent, which took place in October this year, was made by Messrs. C. Gillman and P. Nason. No great difficulty was encountered in reaching the Saddle Plateau, which, at a height of some 15,000 ft., separates the two peaks of the mountain, Mawenzi, the rocky one rising to 17,570 ft., and Kibo, the ice-capped one, rising to 19,720 ft. The rarefied atmosphere forced two of the party and several native carriers to give up the attempt at altitudes varying from 16,000 ft. to 18,500 ft. The top was reached only with difficulty on this account. Many photographs were secured. Mr. Gillman notes that a comparison of the actual extent of the ice with that indicated on Dr. Meyer's photographs proves a considerable shrinkage of the glaciers, especially on the south-east, east, and north side of the peak of Kibo.

THE following are among the lecture arrangements at the Royal Institution before Easter:—Prof. J. A. Fleming, six lectures adapted to a juvenile auditory on electric waves and wireless telephony, beginning on Thursday, December 29. On Tuesday afternoons, commencing on January 17, there will be two lectures on "Physiology as Applied to Agriculture," by Dr. F. H. A. Marshall; three by Prof. H. H. Turner on "Variable Stars"; five by Sir Arthur Keith on "Anthropological Problems of the British Empire—Series I.: Racial Problems in Asia and Australasia"; and two by Dr. J. W. Evans on "Earth Movements." On Thursday afternoons Mr. Seton Gordon will give two lectures on "Mountain Birds of Scotland and Sea Birds and Seals"; Sir Napier Shaw, two on "Droughts and Floods"; Prof. A. G. Perkin, two on "Dyeing: Ancient and Modern"; Prof. H. Maxwell Lefroy, two on "The Menace of the Insect Pest: The Balance of Life in Relation to Insect Pest Control"; Dr. P. Chalmers Mitchell, two on "The Cinema as a Zoological Method"; and Prof. A. M. Hind, two on "Landscape Etchers: New and Old." On Saturdays there will be six lectures by Sir Ernest Rutherford on "Radio-activity." The first Friday evening discourse will be given on January 20 by Sir James Dewar on "Soap Films and Molecular Forces." Succeeding discourses will probably be given by Viscount Burnham, Sir Francis Younghusband, Prof. W. D. Halliburton, Dr. R. S. Watson, Prof. J. Joly, Dr. C. M. Wenyon, Prof. T. R. Merton, Dr. A. P. Laurie, Prof. F. G. Donnan, Mr. A. B. Walkley, and others.

THE Report of the Committee on Ancient Earthworks and Fortified Enclosures issued by the Congress of Archæological Societies for 1920 indicates that the damage anticipated from military entrenchments and other activities during the war has not been serious. Attention is directed to the rapid destruction of the hill-fort at Penmaenmawr by a quarrying company, and it is pointed out that the Act contains no provision for the payment of compensation to the owners of any ancient monument who would suffer pecuniarily if it were taken over by the public. Bokerly Dyke, on the borders of Dorsetshire and Hampshire, is suffering greatly from the burrowing of rabbits, but it is not clear that this constitutes the "neglect" which would justify the Ancient Monuments Board in taking action for its preservation.

THE seventh Scientific Report of the Investigations of the Imperial Cancer Research Fund, which has recently been issued, cannot be said to throw much further light on the problem of the causation and prevention of malignant disease, although its contents have much scientific value and represent a considerable volume of research work which may be preliminary to more important later results. Long-continued study of transplantable tumours in the mouse and rat has shown that many of the characteristics of these tumours are consequent on slight biological differences subsisting between the cells of the organism in which the propagable tumour arises, and the cells and fluids of the successive hosts of the same species in which it is growing. The minute and painstaking investigations detailed in this report on the fundamental physiological processes of normal and cancerous cells, although not completed, have great value. The experiments by Drs. Murray and Woglom described in the report are important as throwing light on the means by which cancer can be artificially produced and on the cell changes occurring in the affected parts. It may be hoped that continuation of this investigation will throw new light on the origin of cancer not artificially produced.

THE Department of Public Health of the Ministry of the Interior (Egypt) have recently published an instructive report by Prof. W. H. Wilson on the nutritive values of rations issued to officials and other public employees. Owing to the fact that a considerable proportion of the protein is supplied as vegetable protein, it was necessary to estimate its biological value, and to this end the author has utilised the results of K. Thomas, although, as he remarks, these can be regarded as only approximately correct. Prof. Wilson bases his conclusions as to the sufficiency of a diet upon the following considerations. He holds that the daily intake of available animal protein should not be less than 40 gm., that the fat intake should not fall below 30 gm., and the gross Calories should vary from 2600 for sedentary to 3450 for moderate or "hard" labour. It appears that several of the Ministry of Education's ration scales are defective, and all those of the Ministry of War. Respecting the latter he writes: "Presumably the men are able to supply themselves from a canteen; this, however, can hardly account for the low level of what is stated to be the active service ration." This latter is defective to the extent of 543 Calories in respect of available energy, 14 gm. on the fat account and 5·5 gm. of protein. The following remark is of interest: "In February, 1919, the writer recommended that, in view of the number of relapses and high mortality from pellagra among the patients at the 'Abbâsîya Asylum on a diet the protein biological value of which was 49·5 (the diet being satisfactory in other respects), that this should be raised to 60. The result has confirmed the correctness of the assumption upon which the suggestion was made, a very remarkable diminution having taken place in the incidence and mortality from pellagra."

THE Proceedings of the South London Entomological and Natural History Society for 1920–21 record a successful year's activities. The finances of the society are in a healthy condition, owing partly to the generosity of friends and to the fact that the membership has increased from 162 to 184. The present issue includes three papers of general interest to entomologists. In his presidential address Mr. K. G. Blair gives an interesting summary of the more elementary facts concerning hibernation in insects. Mr. G. E. Frisby contributes a short paper on the habits of the British Aculeata, and succeeds in compressing a large amount of information within a small compass. Dr. F. A. Dixey, in a paper entitled "Sexual Dimorphism," illustrates his remarks with reference to butterflies, in which the phenomenon is more evident as colour differences than as divergence of form.

THE report of the director of the New York Aquarium for 1920 is a record of useful work done and continued progress made by this excellent institution. The addition of a collecting boat to its equipment has made possible a great improvement in the exhibits, and increased facilities for maintaining and adding to the collections. Arrangements are already in hand for increasing the number of tanks and for enlarging several of the existing ones. The total number of species on exhibition now reaches 191, comprising mammals, reptiles, amphibia, fishes, and invertebrates. The most important of the recent additions are specimens of the alligator garfish and two female Californian sea-lions. The number of visitors during the year reached almost two millions, and the value of the institution for educational purposes may be gauged by the fact that nearly eight thousand school children visited the aquarium with their teachers. In addition to the work of maintaining its own collections, the aquarium also supplied more than eight hundred animals to thirty-four school aquaria, and sent a number of specimens of Limulus to the Zoological Society of Berlin, about half of which arrived in healthy condition.

THE Report of the Geological Survey Board and of the Director for 1920 (1921, price 1s.) shows the remarkable progress made by this national service under the care of the Department of Scientific and Industrial Research. Though the retirement of Sir Aubrey Strahan and of Mr. G. W. Lamplugh will be keenly felt, the staff, under the directorship of Dr. J. S. Flett, has been strengthened by the addition of two district geologists, six geologists, and three other officials. The importance of a revision of the mapping of the coalfields, and the renewed attention given to deposits of minerals of economic value, are responsible for this satisfactory development, which was fortunately secured before the claims of external trade and internal unemployment became so painfully urgent in the present year. A scientific branch with the traditions of the Geological Survey of Great Britain does much to justify itself among educated producers, whether they own the land or toil beneath its surface. The age has gone by when William Smith had to direct attention to the attractions and advantages of geology by remarking that "the search for a fossil may be considered at least as rational as the pursuit of a hare."

THE British Association has issued the twentieth report of its Committee on Photographs of Geological Interest. Prof. S. H. Reynolds, of the University of Bristol, as secretary of the committee, is glad to receive unmounted copies of any photographs recording noteworthy sections or exposures, or illlustrating the relations of geological structure to scenery in the British Isles, and the prints so sent are registered and preserved for reference at the Museum of Practical Geology, 28 Jermyn Street, London. The inquirer who desires a copy for his own use is referred to the author of the photograph. The list attached to the twentieth report includes a large series of half-plate and quarter-plate pictures from Gloucestershire by Prof. Reynolds, mainly illustrating the famous Carboniferous sequence in the Avon gorge, and forty-five half-plate views of glacial deposits in Suffolk by that keen worker, the late W. Jerome Harrison. Mr. J. Ritchie contributes a series illustrating the erosion due to a cloud-burst in Aberdeenshire in 1891. It is much to be desired that funds would allow of the issue with such lists of small photographic reproductions from the registered views; but this would, of course, be impossible at the present time. Geologists near London, at any rate, have the advantage of consulting a very valuable series of records in an institution which has always been a bureau of scientific information.

THE rainfall of Southern Rhodesia is the subject of a communication by Mr. A. H. Wallis, reprinted from the *South African Railways and Harbours Magazine*, September, 1921. A map gives the seasonal, or annual, rainfall for several districts, obtained from the average of all observation stations in each district, for the period of six years ending June 30, 1919. The rains fall generally between October of one year and April of the following year. There are 239 rainfall observation stations in the country, all with voluntary observers, although, as it is pointed out, Rhodesia has been only thirty years under white occupation. Mashonaland, with an area of 114,000 square miles, is divided into sixteen rainfall districts and has 151 observing stations. Matabeleland, with an area of 60,728 square miles, is divided into thirteen rainfall districts with a total of 88 observing stations. The average seasonal, or annual, rainfall, ending June, for the whole of Southern Rhodesia is 30·38 in., that for Mashonaland 34·07 in., and for Matabeleland 26·69 in. The heavier rainfall in Mashonaland is accounted for by its being closer to the sea coast, where it has more favourable opportunity of catching the precipitation from the moisture-laden winds which blow from the eastward. The average amounts of rain for the several districts given in the map do not appear very divergent, but the falls in the several seasons are said to be sometimes very different.

In No. 17 of the Geophysical Memoirs of the Meteorological Office Dr. Chree discusses "Simultaneous Values of Magnetic Declination at Different British Stations." Of recent years the Meteorological Office has issued two-hourly readings of the magnetic declination at Kew, which are published during the ensuing week for the benefit of mining engineers and surveyors. The question has arisen as to how far the values and changes thus recorded are applicable as standards at distant stations in the British Isles. In order to throw light on the subject, Dr. Chree has made a large number of detailed comparisons between the daily magnetic changes at Kew, Falmouth, Eskdalemuir, and Stonyhurst. It appears that the irregular movements in declination recorded at any two British stations show a general similarity, and certain general relationships of a not very definite kind are found between the variations at the different observatories. There are, however, differences which are of importance where accuracy in surveying is required to within 10′ of arc. In any case, surveyors' observations taken during a time of short-period oscillations, as indicated by reference to observatory records, should be repeated.

In the November issue of the Dutch periodical, *de Natuur,* Mr. J. W. Giltay, of Delft, describes an instrument, the "optaphé," intended to enable blind persons who cannot use the optophone (owing to their not having an ear for musical differences), to read common printed matter by *feeling*. Five selenium cells are mounted on a screen, and the enlarged image of the letter to be read slides over the cells. Each cell is connected with a relay and a battery. So long as the cell is illuminated, the armature is drawn towards the electromagnet, and a contact is open. As soon as the cell, or part of it, is darkened by a part of the (black) image of a letter, the magnet lets go the armature, and the contact is closed. This contact shuts the secondary of a small induction-coil, in the primary of which an interrupted current is circulating. A box receiver is connected with the secondary; so long as this secondary is shut by the relay the diaphragm vibrates. The tips of the five fingers of, say, the right hand are touching lightly on the diaphragms of five receivers. The combinations of the vibrations of those five telephones play the same *rôle* as the five tones of the optophone. The diaphragms are not circular; part of them has been cut off, as the usual diaphragm of a small receiver does not give sufficiently strong vibrations. For further particulars and illustrations reference should be made to the Dutch periodical.

A new light alloy bearing the name of "Silumin" has been placed on the market in Germany. According to the *Zeitschrift des Vereines deutscher Ingenieure* of November 5, this alloy, which was exhibited at the recent motor show in Berlin, contains 14 per cent. silicon and the remainder is aluminium. It has a specific gravity of 2·5–2·65, *i.e.* 10 per cent. lower than the usual alloys of aluminium–copper–zinc. The tensile strength is 12·7 tons per sq. in., which is 25–30 per cent. higher than that of the alloys mentioned, while the elongation (5–10 per cent.) is double that of the common alloys. The tensile strength decreases slowly with rise in temperature. At room temperature, silumin has a hardness figure of 60 kg. per sq. mm. (38 tons per sq. in.) with a load of 500 kg. and a 10 mm. ball, and at 350° C. 20–25 kg. per sq. mm. (12·6–15·7 tons per sq. in.). It remains impervious to saturated steam, while dilute (25 per cent.) nitric acid, and even concentrated acid do not attack it as much as they do pure aluminium. In the presence of other acids and alkalies, it behaves much the same as pure aluminium. The thermal conductivity of silumin is to that of pure aluminium as 4 : 4·7, while the thermal expansion coefficient is 0·88, taking that of pure aluminium as 1. Silumin is produced by combining the two constituents, with certain additions, but it can also be manufactured electrolytically in the same way as pure aluminium. After manufacture it is "refined" by appropriate treatment.

A paper read by Dr. James W. French before the Optical Society on November 10 contained data relating to the interocular distance of 409 individuals tested. For men over eighteen years of age the average interocular distance recorded was 63 mm.; the smallest value was 56 mm., and the largest 72 mm. For women the mean value was 61 mm., *i.e.* 2 mm. less than the average interocular distance of the men. The smallest separation recorded was 54 mm., 2 mm. smaller than the smallest male value. The maximum separation was 67·5 mm., *i.e.* 4·5 mm. smaller than the highest male value. For adults of both sexes the average interocular distance was 62 mm. After seventeen years of age there does not seem to be any definite change in the average interocular distance of male adults. At fifteen the average was found to be 59·6 mm., and at sixteen, 61·4 mm. From these measurements it is seen that binocular instruments adjustable between the limits of 56 mm. and 72 mm. would suit most users. Prismatic binoculars are usually made adjustable between the limits of 57 and 70 mm. This higher limit of 70 only excludes about ½ per cent. of the total number of individuals tested. The lower limit of 57 excludes a larger proportion, namely 1¼ per cent., the total excluded by these extreme limits being, therefore, only about 1¾ per cent.

It would not seem desirable to prejudice the design of a prismatic binocular by attempting to suit this small proportion of extreme cases.

A paper on sea casualties and loss of life, read by Sir Westcott S. Abell before the North-East Coast Institution of Engineers and Shipbuilders on November 4, gives a very interesting analysis for the period of twenty-three years immediately preceding the war (1890–1913). From the results of this analysis, which are displayed both in tabular and graph form, it appears that the chance of loss of life of a passenger by reason of marine accident is about 0·02 per cent. Further, if it were possible to attain absolute perfection in the ship herself, then the reduction in loss of passenger life would amount to 70 per million passengers carried per annum. If, however, the location of casualty and the fact that technical ship and machinery regulations cannot provide against strandings and certain miscellaneous risks be considered, it would be possible to reduce loss of life to 30 per million per annum. Taking the whole twenty-three-year period, the number of deaths of passengers at sea from disease is nearly four times the number arising from marine accidents. The average death-rate from all causes for European seamen engaged in foreign trade in British vessels is about 4·0 per thousand, and the occupational risk is about 2·0 per thousand. The risk to underground workers in mines was about 1·7 per thousand in 1913, and averaged 1·5 per thousand from 1890–1900.

Mr. D. E. Pye-Smith, of Gonville and Caius College, has become a partner in the firm of Messrs. Bowes and Bowes, booksellers, Cambridge, which will continue to be carried on under the present title.

The latest catalogue (No. 90) of second-hand books issued by Messrs. Dulau and Co., Ltd., 34 Margaret Street, W.1, gives particulars of upwards of 1600 works on botany, fossil plants, and agriculture, many formerly the property of the late Prof. Ph. van Tieghem, Paris. The list should be useful to librarians and others. We notice that, in addition to the foregoing, Messrs. Dulau are offering for sale many autograph letters of eminent men of science collected by the late Dr. Henry Woodward and Prof. Rupert Jones.

Messrs. H. K. Lewis and Co., Ltd., 136 Gower Street, W.C.1, have just published a short illustrated account of the establishment and progress of their seventy-seven years' (1844–1921) work as medical and scientific publishers and booksellers. Though the pamphlet refers particularly to the medical aspects of the business and the technical and scientific sides of the bookselling and library departments are referred to only briefly, for many years books on all kinds of manufactures have come within the scope of the firm's activities.

Our Astronomical Column.

Fireballs.—Mr. W. F. Denning writes:—"On Sunday, December 4, a large fireball was observed by Mr. E. H. Collinson from Ipswich at 10h. 10m. p.m. It was estimated to be several times brighter than Venus, and its path was from $288+67^{\circ}$ to $279+51^{\circ}$; it moved swiftly, and left a silvery streak along its flight.

"A large and very brilliant meteor was viewed from Eastbourne and other places on Wednesday, December 7, at 9.30 p.m. It illuminated the sky with a strong glare, and many persons mistook it for ball lightning. Exact particulars of the path of this object have not yet come to hand.

"Observations of the Geminid meteor shower were commenced from Bristol on the morning of December 10 at about 3 a.m. In one hour's watch sixteen meteors were recorded, of which eight belonged to the Geminid stream, the radiant point being well defined at $108+32\frac{1}{2}^{\circ}$. Bright meteors were seen at 3.4 and 3.56 a.m., but these belonged to other showers."

Observers' Handbook, 1922 (British Astronomical Association).—When it became known that the "Companion to the Observatory" was being discontinued, the British Astronomical Association decided to fill the gap, entrusting the work to the Computing Section, of which Mr. L. J. Comrie is director. The Handbook has just been issued at the price (to non-members) of 2s. Its aim is not to supersede, but to supplement, the use of the *Nautical Almanac*, very little space being given to matter contained there.

The conditions of visibility of the planets in the different months are exhibited graphically in a diagram. Phenomena of Saturn's satellites are given, having been computed by Major Levin.

Other subjects included are periodic comets, variable stars (the ephemeris of Algol is corrected by recent observations), double stars, of which a series of test objects is given, graduated for apertures from 1 in. to 10 in., meteors, occultations, etc.

There are also descriptive notes on objects of special interest in the stellar heavens, and extensive tables of elements and constants. In short, the handbook promises to be of great utility to observers of almost every class.

Perturbations of Saturn's Rings.—Dr. G. R. Goldsbrough (Phil. Trans., A, vol. 222) examines the perturbations of the ring particles produced by Saturn's satellites. He neglects the oblateness of Saturn and the mutual actions of the ring particles, and then finds boundaries of the zones of instability produced by the separate satellites. The action of Mimas is predominant, owing to its nearness; he find that it should produce a division from radius 16·9″ to 17·64″ (heliocentric distances from Saturn's centre), the figures agreeing exactly with the edges of the great Cassini division. It should also produce a clearance from radius 20·2″ to its own orbit; the actual outer edge of the ring is at 20·0″. Dione should produce a clearance from Saturn's surface to 9·34″; the actual inner edge of the crêpe ring is at 10·83″. Lowell reported a black band between ring B and the crêpe ring, which the author ascribes to the action of Rhea. It is shown that the dissipative action in each case is most effective in the outer portion of the unstable zone. The author thus explains the failure of Titan to dissipate the whole of the bright rings, which lie in Titan's zone of clearance (extending from the planet to radius 29·94″), but in the portion where the dissipative action is weakest. The author concludes, however, that this action will eventually dissipate the whole ring.